CLAIMS

We claim:

1. An epitaxial wafer comprising:

a substrate;

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a III-V nitrides alloy buffer layer on the substrate initially formed by spin-coating; and

epitaxial a III-V nitrides alloy layers on the buffer layer.

2. The epitaxial wafer of claim 1 wherein the substrate and the epitaxial III-V nitrides alloy film have different lattice constants.

3. The epitaxial wafer of claim 1 wherein the buffer layer is selected from the group consisting of GaN, AlN, InGaN, and AlGaN.

4. The epitaxial wafer of claim 1 wherein the substrate is selected from the group consisting of sapphire, SiC, Si, GaAs, InP, GaP, ZnO, MgO, $LiGaO_2$, and $LiAlO_2$.

5. The epitaxial wafer of claim 1 wherein the epitaxial III-V nitrides alloy film comprises a pn junction.

6. The epitaxial wafer of claim wherein the buffer layer comprises a plurality of layers of III-V nitrides alloy in which each layer has a different composition ratio from the other layers.

7. The epitaxial wafer of claim 6 wherein the lattice constant in the plurality of layers are monotonously increased or decreased from the substrate to the epitaxial III-V. nitrides alloy film.

8. The epitaxial wafer of claim 1 wherein the substrate comprises a cover layer on the surface on which the buffer layer is formed.

9. The epitaxial wafer of claim 8 wherein the substrate is silicon and the cover layer is silicon carbide.

10. The epitaxial wafer of claim 8 wherein the substrate is silicon and the cover layer is zinc oxide.

11. An epitaxial wafer comprising:

a substrate;

a metal oxide buffer layer on the substrate initially formed by spin-coating; and

an epitaxial III-V nitrides alloy film on the buffer layer.

12. The epitaxial wafer of claim 11 wherein the substrate and the epitaxial III-V nitrides alloy film have different lattice constants.

13. The epitaxial wafer of claim 11 wherein the buffer layer is selected from the group consisting of zinc oxide, magnesium oxide, and aluminum oxide.

14. The epitaxial wafer of claim 11 wherein the substrate is selected from the group consisting of sapphire, SiC, Si, GaAs, InP, GaP, ZnO, MgO, $LiGaO_2$, and $LiAlO_2$.

15. The epitaxial wafer of claim 11 wherein the epitaxial III-V nitrides alloy comprises a pn junction.

Sub A2 16. An epitaxial growth method of III-V nitrides alloy, comprising:

spreading liquid comprising group III elements and nitrogen on a substrate;

coating the substrate with a thin film comprising group III elements and nitrogen by spinning at certain rotation speeds; and

growing an III-V nitrides alloy film on the spin-coated film.

Sub B1 17. The epitaxial growth method of III-V nitrides of claim 16 further comprising annealing in a gas atmosphere, wherein the gas atmosphere comprises a gas, wherein the gas comprises nitrogen as an element.

18. The epitaxial growth method of III-V nitrides of claim 17 wherein the annealing occurs after the coating and before the growing.

19. The epitaxial growth method of III-V nitrides of claim 17 wherein the gas atmosphere comprises ammonia.

20. The epitaxial growth method of III-V nitrides of claim 17 wherein the gas atmosphere comprises radical nitrogen atoms.

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21. The epitaxial growth method of claim 16 wherein the spin-coated film after the annealing is selected from the group consisting of GaN, AlN, InGaN, and AlGaN.

22. The epitaxial growth method of claim 16 wherein the substrate is selected from the group consisting of sapphire, SiC, Si, GaAs, InP, GaP, ZnO, MgO, $LiGaO_2$, and $LiAlO_2$.

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23. The epitaxial growth method of claim 16 wherein the epitaxial III-V nitrides alloy film comprises a pn junction.

24. The epitaxial growth method of claim 16 wherein the epitaxial III-V nitrides alloy film is grown by a method selected from the group consisting of metal organic chemical vapor deposition, molecular beam epitaxy, and hydride vapor phase epitaxy.

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25. The epitaxial growth method of claim 24 wherein the epitaxial III-V nitrides alloy film is grown by a sequential combination of more than two growth methods selected from the group consisting of metal organic chemical vapor deposition, molecular beam epitaxy, and hydride vapor phase epitaxy.

26. The epitaxial growth method of claim 16 wherein the buffer layer is formed by more than two spin coatings.

27. The epitaxial growth method of claim 26 wherein the buffer layer is formed by more than two cycles of spin coating and annealing.

28. The epitaxial growth method of claim 26 wherein the composition ratio varies in the buffer layer.

29. The epitaxial growth method of claim 26 wherein the lattice constant in the buffer layer is monotonously increased from the substrate to the epitaxial III-V nitrides alloy film.

30. The epitaxial growth method of claim 26 wherein the lattice constant in the buffer layer is monotonously decreased from the substrate to the epitaxial III-V nitrides alloy film.

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31. The epitaxial growth method of claim 16 wherein the substrate has a cover layer on the surface on which the spin coating is applied.

32. The epitaxial growth method of claim 31 wherein the used substrate is silicon covered by silicon carbide.

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33. The epitaxial growth method of claim 30 wherein the used substrate is silicon covered by zinc oxide.

34. An epitaxial growth method of III-V nitrides alloy, comprising:

spreading liquid comprising group III elements and nitrogen on a substrate;

coating the substrate with a thin film comprising metal elements and oxygen by spinning at certain rotation speeds; and

growing an III-V nitrides alloy film on the spin-coated film.

35. The epitaxial growth method of III-V nitrides of claim 34 further comprising annealing in a gas atmosphere, wherein the gas atmosphere comprises a gas, wherein the gas comprises oxygen as an element.

36. The epitaxial growth method of III-V nitrides of claim 35 where the annealing occurs after the coating and before the growing.

37. The epitaxial growth method of III-V nitrides of claim 35 wherein the gas atmosphere comprises $H_2O$ gas.

38. The epitaxial growth method of III-V nitrides of claim 35 wherein the gas atmosphere comprises $O_2$ gas.

39. The epitaxial growth method of claim 34 wherein the spin-coated film after the annealing is selected from the group consisting of zinc oxide, magnesium oxide, and aluminum oxide.

40. The epitaxial growth method of claim 34 wherein the substrate is selected from the group consisting of sapphire, SiC, Si, GaAs, InP, GaP, ZnO, MgO, $LiGaO_2$, and $LiAlO_2$.

41. The epitaxial growth method of claim 34 wherein the epitaxial III-V nitrides alloy film comprises a pn junction.

42. The epitaxial growth method of claim 34 wherein the epitaxial III-V nitrides alloy film is grown by a method selected from the group consisting of metal

organic chemical vapor deposition, molecular beam epitaxy, and hydride vapor phase epitaxy.

Sub A7 43. The epitaxial growth method of claim 34 wherein the epitaxial III-V nitrides alloy film is grown by a sequential combination of more than two growth methods selected from the group consisting of metal organic chemical vapor deposition, molecular beam epitaxy, and hydride vapor phase epitaxy.

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